COURSE OUTLINE

Physics 311: Introduction to Quantum Physics I

Fall, 2013, R. Hulet

Website: OwlSpace

Consultations: I am happy to meet with students at any time, but would appreciate it if you contact me in advance for an appointment. I am located in Brockman Hall, Rm. 391. My email address is: randy@rice.edu.

Required text: J. Townsend, "A Modern Approach to Quantum Mechanics", 2nd Edition.

Recommended texts for consultation:

S. Gasiorowicz - emphasis on wave mechanics
R. Liboff - also emphasizes wave mechanics, but with more exposition than Gasiorowicz
C. Cohen-Tannoudji *et al*. - advanced, but very precise and thorough; many examples
R. Shankar - good mathematical introduction and chapter on path integrals
D. Griffiths - very readable; many problems

Grade Structure:

40% homework (~12 sets)
20% mid-term exam
30% final exam
10% class participation

Lectures will be supplemented with in-class problem sessions lead both by the Professor and the students. A portion of the grade (10%) will be based on participation in class discussions, attendance, and problem solving sessions.

I encourage you to work together on problem sets as discussion can be very helpful in learning quantum mechanics. However, copying a solution from any source, including your classmates or material from previous years, is not helpful and is a violation of the honor code. The exams will be open text book (Townsend) and notes, but are to be done independently, without discussion.

Late Homework Policy:

Homework is due in class at **9 am**. However, you may submit one late assignment per semester, no questions asked, as long as it is turned in by 9 am the day of the next lecture. If you have a serious health problem, or other serious problem that will prevent you from turning in your homework on time, then discuss it with me, preferably before it is due. Otherwise, late homework is not accepted.

If you have a documented disability that will impact your work in this class, please contact me to discuss your needs. Additionally, you will need to register with the Disability Support Services Office in the Ley Student Center.

Course Topics (chapters 1-7, 9-10)

I. Spin-½ System

1. Concept of spin
2. Stern-Gerlach experiment
3. Linear vector spaces
4. Dirac notation
5. Matrix mechanics - observables, operators, expectation values, rotation of basis states
6. Angular momentum - eigenstates/eigenvalues, commuting observables

II. Wave Mechanics

1. Schrödinger equation
2. Uncertainty principle
3. One-dimensional potentials - tunneling, scattering, resonances
4. One-dimensional harmonic oscillator

III. Two Spin-½ Particles

1. Addition of angular momentum
2. EPR paradox - Bell's Inequalities

IV. Central Forces

1. Separation of angular and radial motion
2. Angular equation
3. Radial equation
4. Hydrogen atom